

REMARKS

Upon entry of the present amendment, claims 1-3 and 5-13 will remain pending in the above-identified application, with claims 1-3 and 5-9 standing ready for further action on the merits, and claims 10-13 being withdrawn from consideration based upon an earlier restriction requirement.

The amendments made herein to the claims do not incorporate new matter into the application as originally filed. For example, the amendment to claim 1 finds support in original claim 4, now cancelled. Similarly, the amendment to claim 8 to correct formula numbers, finds support at page 31 of the specification.

Applicants appreciate the Examiner's comments as set forth in paragraph 1 of the Office Action, wherein the Examiner indicates that "If the catalyst claims of Group I are found allowable, the Examiner may consider rejoining the process claims of Group II." Applicants believe that the present amendments have resulted in the claims of Group I containing allowable subject matter. As such, the Examiner is respectfully requested to rejoin the claims of Group II at this time (i.e., claims 10-13).

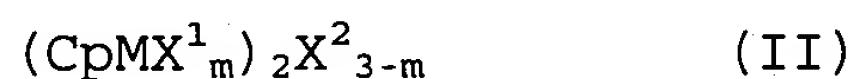
Claim Rejections Under 35 USC § 112

Claim 1 has been rejected under 35 USC § 112, second paragraph. Reconsideration and withdrawal of this rejection is requested based upon the amendment made herein to claim 1. In this

respect, claim 1 as now amended provides proper antecedent basis for each of the terms utilized therein. This is further evidenced by the following considerations.

The limitation (A) in the amended claim 1 means that "a number of a transition metal contained in the transition metal compound is the same as a number of a group having a cyclopentadiene type anion skeleton contained in said transition metal compound".

To explain more specifically, a preferable transition metal compound disclosed in the present specification (page 5, line 21 - page 6, line 10) has the following formula (I) or (II), wherein M represents a transition metal atom of the Group IV of the Periodic Table of the Elements; and Cp represents a group having a cyclopentadiene type anion skeleton.



According to these formulas, it is clear that a number of the transition metal atom (M) is the same as a number of the group (Cp) having a cyclopentadiene type anion skeleton; namely said number is 1 (one) in the formula (I), and said number is 2 (two) in the formula (II), respectively.

Claim Rejections Under 35 USC § 103

Claims 1-9 have been rejected under 35 USC § 103(a) as being unpatentable over Yamamoto et al. (US 6,121,401) in view of Lee et al. (Journal of Molecular Catalysis A: Chemical 132 (1998) 231-239). Reconsideration and withdrawal of this rejection is respectfully requested based upon the following considerations.

The Present Invention and Its Advantages

The present invention relates to an olefin polymerization catalyst prepared by using a modified aluminumoxy compound as one component thereof, and a process for producing an olefin polymer with said catalyst.

While processes for producing an olefin polymer utilizing a metallocene complex have been reported previously, the present invention provides unexpected and advantageous properties and results, in that the present invention provides an olefin polymerization catalyst giving an olefin polymer of higher molecular weight, in addition to a process for producing an olefin polymer having a high molecular weight using said catalyst.

Distinctions Over the Cited Art

Yamamoto et al. (US 6,121,401)

In order to obtain an olefin polymer of higher molecular weight in the present invention, a reaction of an aluminumoxy

compound (C1) with a boron compound (C2) has to be carried out at a temperature of from 50°C to 150°C to obtain (C) a modified aluminumoxy compound.

Although Yamamoto discloses a combination of an aluminumoxy compound with a boron compound, Yamamoto is silent about such a reaction temperature range.

Additionally, when said reaction is carried out at a lower temperature (for example, at 30°C), an olefin polymerization catalyst capable of giving an olefin polymer of higher molecular weight cannot be obtained.

Lee et al. (Journal of Molecular Catalysis A: Chemical 132 (1998) 231-239)

Although Lee discloses a transition metal compound, a number of a transition metal therein is not the same as a number of a group having a cyclopentadiene type anion skeleton therein; namely, Lee's transition metal compound is quite different from Component (A) recited in the present amended claim 1.

Accordingly, because neither the cited Yamamoto nor Lee references disclose, provide or otherwise teach those of ordinary skill in the art how to arrive at the present invention as claimed, it follows that their disclosures, whether considered singularly or in combination, are incapable of rendering obvious the present invention as claimed. Furthermore, it is noted that even upon

combining the disclosures of Yamamoto and Lee, there is provided no motivation to those of ordinary skill in the art, which would allow them in any way to arrive at the present invention.

Based upon the fact that advantageous properties result from the use of the claimed catalyst (the production of an olefin polymer having a higher molecular weight) it follows that all outstanding rejections over the references of record must now be withdrawn.

Further, based upon Applicant's belief that the instant catalyst claims 1-3 and 5-9 are allowable, the Examiner is now respectfully requested to rejoin process claims 10-13.

CONCLUSION

Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims 1-3 and 5-13 are allowed and patentable under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Bailey (Reg. No. 32,881) at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

(Rev. 02/20/02)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 4 has been canceled.

The claims have been amended as follows:

1. (Twice Amended) An olefin polymerization catalyst prepared by a process comprising contacting (A) and (C), or (A), (B) and (C) described below:

(A) a transition metal compound in which [the] a number of a transition metal is the same as that of a group having a cyclopentadiene type anion skeleton[, in its molecule],

(B) at least one aluminum compound selected from the following (B1) to (B3);

(B1) an organoaluminum compound represented by the general formula $E^1_a AlZ_{3-a}$,

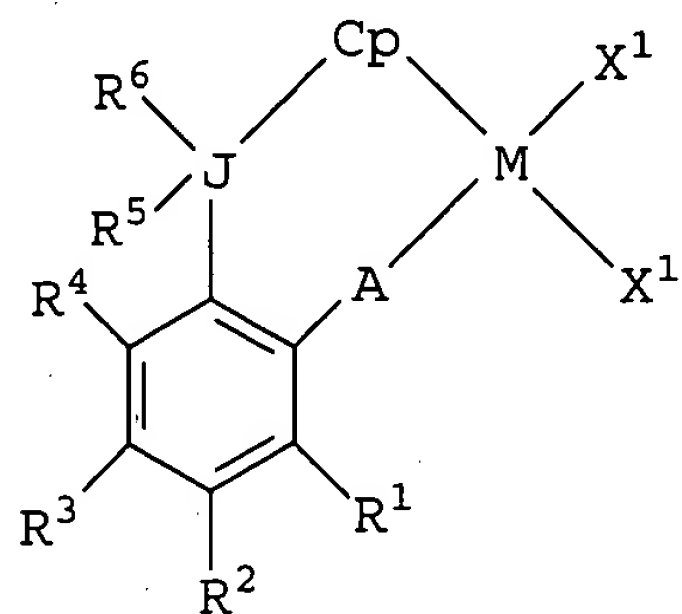
(B2) a cyclic aluminoxane having a structure represented by the general formula $\{-Al(E^2)-O-\}_b$, and

(B3) a linear aluminoxane having a structure represented by the general formula $E^3\{-Al(E^3)-O-\}_c AlE^3_2$,

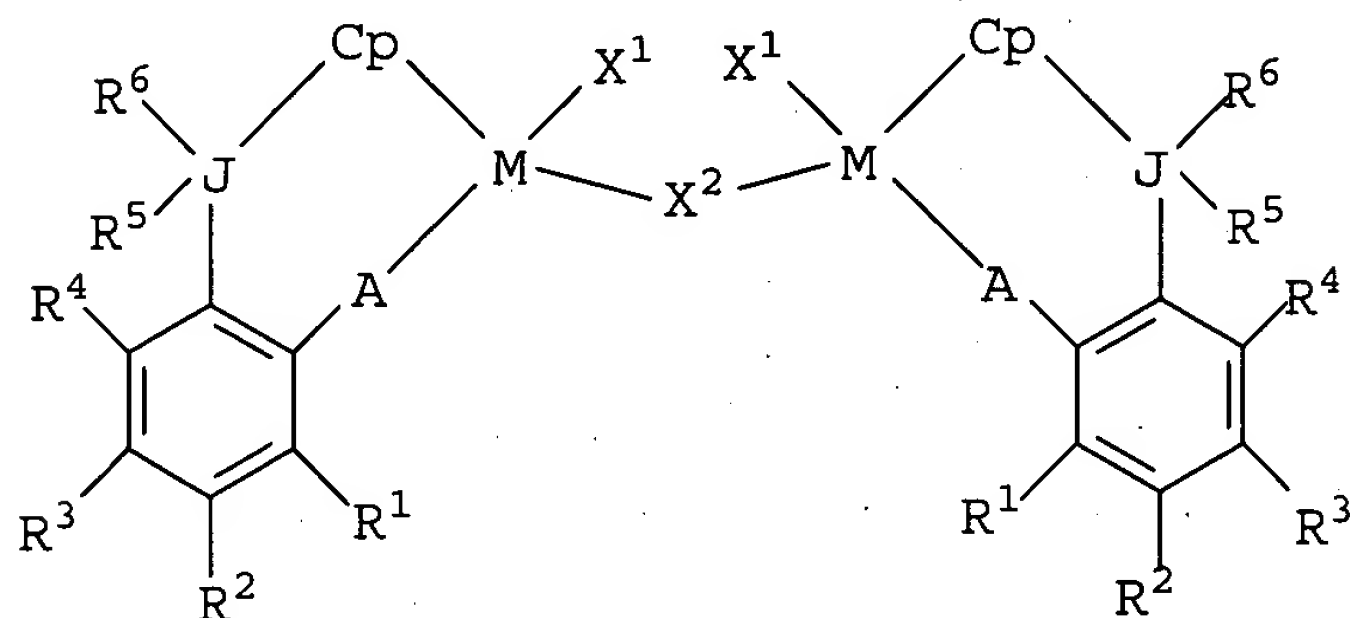
wherein E^1 , E^2 and E^3 respectively represent a hydrocarbon group, all of E^1 , E^2 and E^3 may be the same or different, Z represents a hydrogen atom or a halogen atom, and all of Z may be the same or different, a represents a numeral satisfying $0 < a \leq 3$, b represents an integer of not less than 2, and c represents an integer of not less than 1; and

(C) a modified aluminumoxy compound obtained by reacting an aluminumoxy compound (C1) with a boron compound (C2) represented by the general formula $BQ^1Q^2Q^3$ at a temperature of from 50°C to 150°C, wherein B is a boron atom in the trivalent valence state; and Q^1 , Q^2 and Q^3 are respectively a halogen atom, a hydrocarbon group, a halogenated hydrocarbon group, a substituted silyl group, an alkoxy group or a di-substituted amino group, and they may be the same or different.

8. (Amended) The olefin polymerization catalyst according to claim 1, wherein (A) is a transition metal compound selected from the group consisting of transition compounds represented by the general formulas [(I), (II) or (III)] (V), (VI) or (VII);

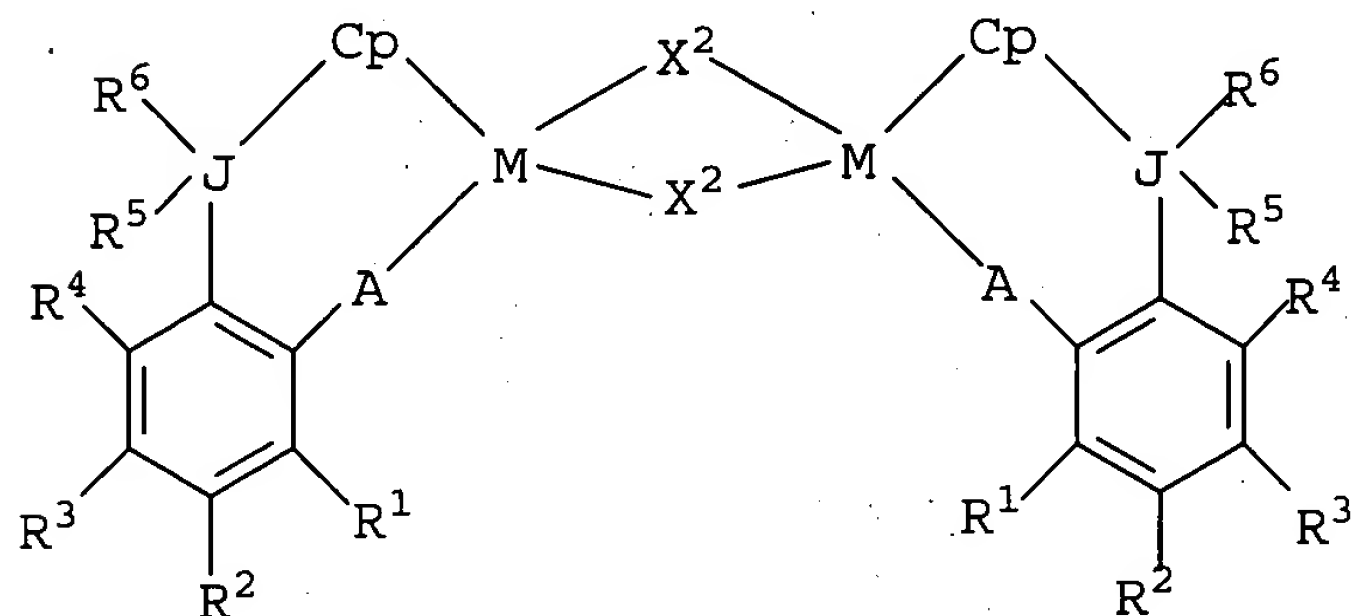


[(I)] (IV)



[(II)] (VI)

, or



[(III)] (VII)

wherein, in the general formula [(I), (II) or (III)] (V), (VI) or (VII), M represents a transition metal atom of the Group IV of the Periodic Table of the Elements; A represents an atom of the Group XVI of the Periodic Table of the Elements; J represents an atom of the Group XIV of the Periodic Table of the Elements; Cp represents a group having a cyclopentadiene type anion skeleton; each of X¹, R¹, R², R³, R⁴, R⁵ and R⁶ independently represents a hydrogen atom, a

halogen atom, an alkyl group, an aralkyl group, an aryl group, a substituted silyl group, an alkoxy group, an aralkyloxy group, an aryloxy group, a di-substituted amino group, an alkylthio group, an aralkylthio group, an arylthio group, an alkylseleno group, an aralkylseleno group or arylseleno group; X^2 represents an atom of Group XVI of the Periodic Table of the Elements; R^1 , R^2 , R^3 , R^4 , R^5 and R^6 may be optionally combined with each other to form a ring; and in the general formula (II) or (III), two of M, A, J, Cp, X^1 , X^2 , X^3 , R^1 , R^2 , R^3 , R^4 , R^5 and R^6 may be respectively the same or different.